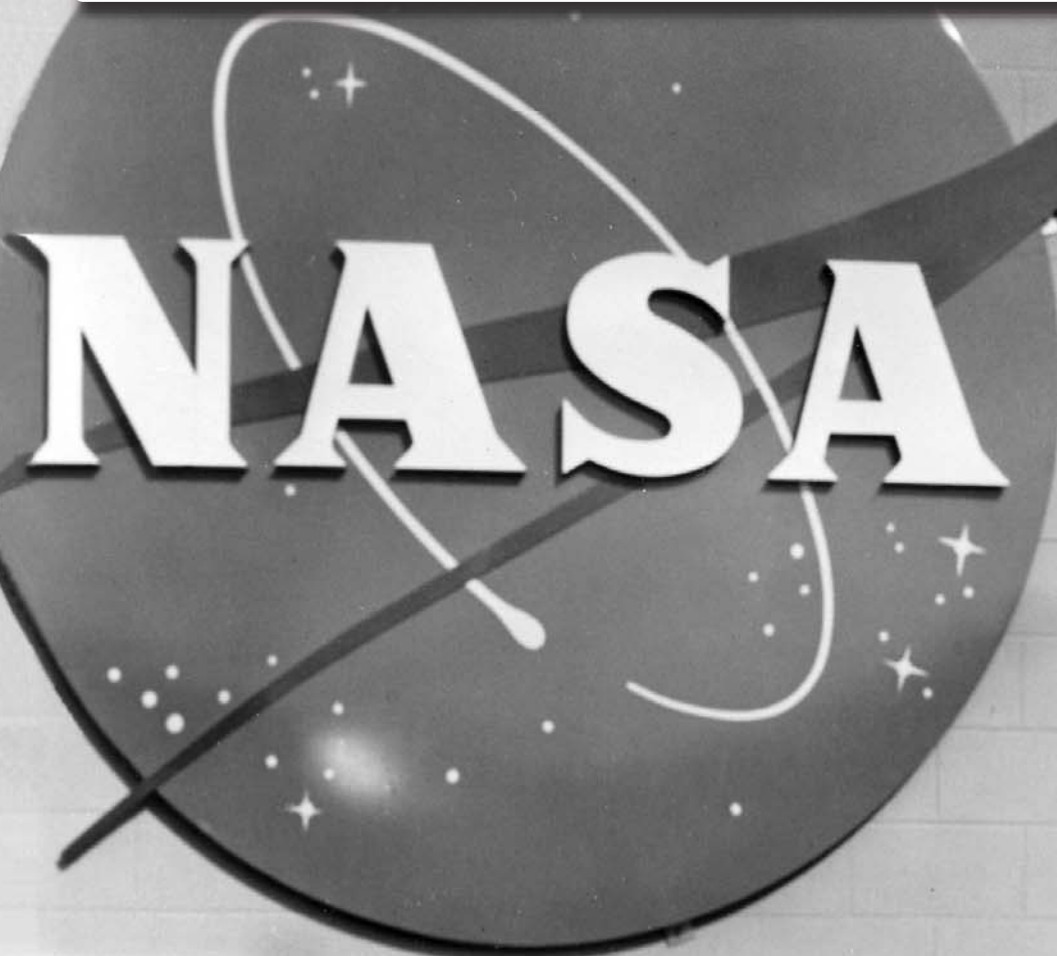


**ASSESSMENT REPORT:
INVENTORY OF HISTORIC ARTIFACTS FROM THE MISSION CONTROL CENTER,
CAPE CANAVERAL AIR FORCE STATION, BREVARD COUNTY, FLORIDA**



MERCURY CONTROL CENTER

Prepared for:
John F. Kennedy Space Center
Environmental Management Branch
Kennedy Space Center, Florida

Prepared by:
Archaeological Consultants, Inc.
8110 Blaikie Court, Suite A
Sarasota, Florida 34240

May 2009



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Sarasota, Florida 34240**

**Joan Deming, MA, RPA – Principal Investigator
Trish Slovinac, MA – Architectural Historian**

May 2009

The [Mercury control] room was square, about sixty feet on each side, dominated by a world map in the front. The map contained a series of circles, bull's-eyes centered on the worldwide network of tracking stations. Below each were boxes containing many different and, for the uninitiated, unintelligible symbols. A toylike spacecraft model, suspended by wires, moved across the map to trace the orbit. On each side of the map were boards, where sixteen critical measurements were plotted by sliding beads, like those on an abacus, up and down wires as the capsule circled the world. In less than four years much of this technology would be obsolete – only the concept of Mission Control would remain. . . now we had to control the missions with fragile communications, a first-generation solid-state computer, slide rules, and guts. We were in the Lindberg stage of spaceflight.

Gene Kranz, *Failure is Not an Option* (2000)

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INTRODUCTION

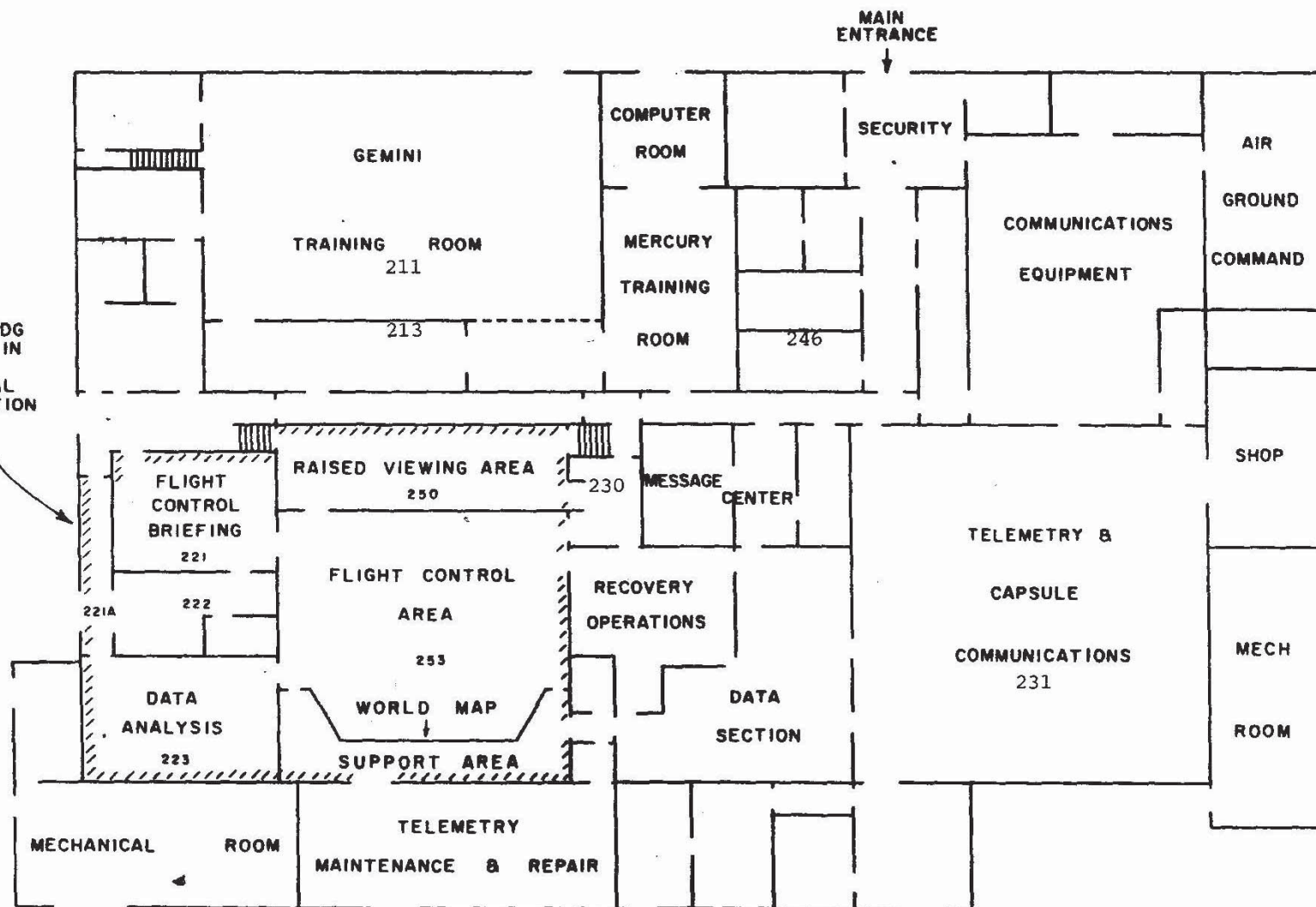
The original Mission (Mercury) Control Center (MCC) (Facility No. 1385) at Cape Canaveral Air Force Station (CCAFS) is considered a contributing resource to the CCAFS National Historic Landmark (NHL) District (Butowsky 1983), designated on April 16, 1984. The MCC was constructed in stages between 1956 and 1963. As defined in the NHL nomination, the building derives its historical significance from six rooms located within the northwestern part of the facility: the Flight Control Area (Room 253), the Raised Viewing Area (Room 250), the Data Analysis Room (Room 223), the Flight Control Briefing Room (Room 221), the NST Room (Room 222), and the north corridor (221A) (**Figure 1**). Rooms 253 and 250 were built in 1959-1960 for Project Mercury; the other four rooms were constructed during 1962-63, in preparation for the Gemini Program. The historically significant portions of Facility No. 1385 constitute roughly ten percent of the overall building (BRPH 2004:5).



Photo 1. Mission Control Center (east-north elevations) in 1964, looking south
(Source: NASA, KSC-64C-2699P-26244).

The National Aeronautics and Space Administration, John F. Kennedy Space Center (NASA-KSC) proposes to demolish this historic property and has determined that such an undertaking is an adverse effect as defined in 36 CFR Part 800, Protection of Historic Properties. In accordance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and its implementing regulations, NASA-KSC has consulted with the Florida State Historic Preservation Officer (SHPO), the Advisory Council on Historic Preservation (ACHP), and the Department of the Interior, National Park Service (NPS). NASA examined several alternatives for the MCC, and determined that there are no operational or administrative uses for this facility. As a result, NASA-

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CONFIGURATION



FLOOR PLAN

MISSION CONTROL

BUILDING # 1385



KSC, the SHPO, the ACHP, and the NPS executed a Memorandum of Agreement (*Memorandum of Agreement Among the National Aeronautics and Space Administration, John F. Kennedy Space Center and the Florida State Historic Preservation Office, and the Advisory Council on Historic Preservation and the Department of Interior, National Park Service Regarding the Demolition of the Mission Control Center at the Cape Canaveral Air Force Station*) that stipulates various mitigation measures in order to take into account the effects of the project on the NHL. Among the mitigation measures specified in the MOA is “Artifact Identification and Collection.”

In accordance with the MOA, the stipulation for Artifact Identification and Collection requires the following:

1. *Prior to demolition, all historic artifacts remaining in the Control Room will be identified, removed, inventoried, properly cataloged, and stored.*
2. *An inventory of the artifacts will be provided to the SHPO and the NPS at completion of their removal and cataloging, prior to demolition of the MCC.*
3. *The items will be stored and, if possible, incorporated into the Visitor Center ESE [Early Space Exploration] Exhibit when it is renovated as part of the Astronaut Hall of Fame relocation. The current target for implementation of the relocation of the Astronaut Hall of Fame is no earlier than the 2015 timeframe.*
4. *NASA-KSC will permit the SHPO and NPS to review and comment on the Visitor Complex ESE Exhibit plans.*

In March 2009, Archaeological Consultants, Inc. (ACI) was contracted to provide an inventory of the historically significant artifacts remaining in the MCC, and make recommendations regarding the disposition of such items. The specific tasks enumerated in the Scope of Work were as follows:

- Examination of historic photographs and drawings of the MCC
- On-site identification and photographic documentation of hardware and other items located in the control room
- Consultation with NASA personnel regarding significance criteria
- Inventory of historically significant and non-significant items
- Consultation with NASA personnel regarding the rationale for retention of individually significant items, as well as viable alternatives (e.g., move to off-site storage; relocate to the KSC Visitor Complex for incorporation into interpretive display)
- Preparation of draft and final Assessment Report, which includes the MCC inventory, identification of historically significant items, and recommendations for disposition.

This Assessment Report was prepared to meet these goals and objectives.

METHODS

On March 4, 2009, ACI's Principal Investigator Joan Deming and Architectural Historian Trish Slovinac conducted an initial inspection of the MCC Flight Control Area (Room 253) and the adjacent historically significant portions of the MCC, as defined in the NHL nomination. The ACI team was accompanied by several individuals with specialized knowledge of the MCC and associated artifacts. These key informants included Luis Berrios, NASA-KSC; Doug Fisher, NASA-KSC (NASA Display Management Team); and Daniel Gruenbaum, Delaware North Park Services of Spaceport, Inc. Following the facility inspection, the ACI team participated in a group discussion with these informants, which resulted in the creation of a preliminary list of significant artifacts recommended for salvage and retention.

Throughout early March, NASA-KSC's Historic Preservation Officer (HPO) Barbara Naylor, and Shannah Trout, Environmental Engineer, assisted the ACI team by identifying potential informants and MCC-related data sources at the KSC and CCAFS. Naylor and Trout scheduled appointments for interviews, secured copies of archival manuscripts, and assisted with the location and reproduction of historic photographs. Elaine Liston, KSC's Archivist, as well as Jennifer Ross-Nazzal, Johnson Space Center (JSC) Historian, provided invaluable aide in the identification of relevant manuscripts and images.

Historical research was carried out prior to and following the on-site inventory. This work focused on visual images of the layout and contents of the original MCC during both the Mercury and Gemini projects. In addition, historical accounts, including oral histories, archival photos, historical videos and commercially available DVDs, *Spaceport News* articles, Mercury mission control operator's manuals, as-built drawings, and other archival materials were examined. Primary sources of information included the photographic collection at the Video and Film Archives, Kennedy Integrated Communications Services, the KSC Archives, the Engineering Documentation Center (EDC) at KSC, the Infrastructure Operations and Maintenance Services (IOMS) EDC at CCAFS, and the External Relations Office at the KSC News Center. ACI is grateful to Luis Berrios for providing the NASA Custodian Account Property Report for 1997, and to Doug Fisher and Daniel Gruenbaum for providing a copy of the 2008 MCC artifact catalog.

Between March 16-19, 2009, Deming and Slovinac returned to the MCC to conduct the inventory, performed in conjunction with the HABS/HAER photodocumentation, in accordance with the stipulations of the MOA. In addition to the MCC, the team inspected and photodocumented the original consoles and other artifacts on display at the ESE exhibit at the KSC Visitor Complex.

The ACI project team extends its heartfelt thanks to the numerous individuals who shared their time, expertise, and materials:

Donna Atkins, KSC-Library D (Abacus Technology)
Luis H. Berrios, KSC-XA-F2
Mario Busacca, KSC-TA-A3
Douglas M. Fisher, KSC-XA-F2
Daniel J. Gruenbaum, KSC-DNPS
Lauren L. Lichtenberger, KSC-XA-E
Elaine Liston, KSC-Library E (Abacus Technology)
Cheryl L. Mansfield, KSC-IMCS-440 (Abacus Technology)
Pauletta K. McGinnis, KSC-TA-B2A-1
Barbara Naylor, KSC-TA-B1C
Jennifer Ross-Nazzal, JSC Historian
Jeanne M. Ryba, KSC-XA-E
Shannah Trout, IHA-200
Sandy Van Hooser, KSC-IMCS-032 (Analex Corporation)

RELEVANT HISTORY

Project Mercury extended from November 1958 through May 1963. During the first two years of the program, all test flights occurred at Wallops Island, Virginia. The Flight Control Area of the MCC was designed and constructed from 1959-1960. The facility was manned for the first time on November 21, 1960 in support of the Mercury-Redstone 1 (MR-1) mission (Swenson et al. 1966:294). Subsequently, it controlled all flights that used a Redstone or Atlas booster. The first manned flight controlled by the MCC was Alan Shepard's suborbital ballistic flight (designated MR-3) on May 5, 1961; the first orbital flight, Mercury-Atlas 6 (MA-6), performed by John Glenn, occurred on February 20, 1962. The MCC was part of a larger, worldwide network of tracking stations, and was described by Christopher Kraft (1959:6) as "the focal point of the entire operation and . . . will make all of the necessary decisions effecting the flight with the exception of certain extreme emergency situations." The primary functions of the facility were to direct all aspects of the flight; monitor aeromedical and systems status; make any decision to abort and determine all proper procedures in support of that decision; command the reentry of the space vehicle; keep the astronaut and all network stations informed of the mission's progress; maintain the flow of communication between all stations; and advise recovery forces as to the appropriate time and location of vehicle landing (Kraft 1959:6-7). The final manned Mercury flight, MA-9, extended from May 15-16, 1963.

Nearly two years elapsed before the first manned mission of the Gemini program. In preparation, the Flight Control Area was extensively modified in 1962-1963. Changes from Mercury to Gemini included the installation of four new consoles and a fifth plot board (to provide data from the guidance officer). The station and instrumentation symbols on the world display map were updated, and a rear projection screen to display flight rules, checklists, and time sequences was added to the right of the map (*Spaceport News* 18 March 1965:3).

The Gemini program missions spanned the period between April 1964 (unmanned Gemini I) and November 1966 (Gemini XII). During this time, the Cape MCC controlled

the first three flights of the Gemini program. The final mission controlled from the Cape was Gemini III, the first manned mission of the program, flown on March 23, 1965 by astronauts Virgil “Gus” Grissom and John Young (Kranz 2000:126). Beginning with Gemini IV on June 3, 1965, the mission control function was transferred to the newly completed mission control building at the Johnson Space Center (then, the Manned Spacecraft Center [MSC]). As a result, the Cape MCC switched from a **mission control** function to a **launch control** function, and provided full-time back-up to the new MCC in Houston (Hacker and Grimwood 1977; *Spaceport News* 22 June 1967:4). During the launch phase, the original MCC provided “real-time data display and command control capability for its flight control team,” as well as “flight dynamics data simultaneously to Goddard and Houston computers for the critical go-no go orbital insertion decision” (*Spaceport News* 3 June 1965:2). The Cape MCC also served as one of NASA’s worldwide manned tracking network stations. All radar, telemetry, command, and air-to-ground real-time data during the flight that was acquired at the Cape and over the Air Force Eastern Test Range was transmitted from here to the MSC (*Spaceport News* 26 August 1965:4). The Cape MCC performed these functions through the entire Gemini program before being “retired” at the completion of Gemini XII in November 1966 (*Spaceport News* 22 June 1967:4).

On June 1, 1967, the MCC became a stop on the NASA tour. The tour scripts changed over the years, with revisions in 1975, 1984, 1986, and finally, in 1992. The 1986 narrative, for example, followed the three-orbit Gemini III mission. As part of the presentation, the position of the spacecraft over the Atlantic Ocean near Bermuda was depicted on the large world map; a green circle with blinking lights indicated that the Bermuda tracking station was in communication with the spacecraft. Colored lights indicated the status of the tracking stations, each depicted by a circle. Yellow circles indicated a minor problem expected to be corrected shortly; red circles indicated a problem with no estimate when it would be corrected. Dotted line circles indicated tracking ships. A status board to the left of the map indicated temperature, pressure, fuel supply and other readings. On the screen to the right of the world map, mission rules were projected (“Tour Stop – Mission Control Center” script, May 1986 revision).

By the 1990s, tourist access to the MCC became more restrictive. Following its inclusion as part of a special interest tour, for which an additional fee was charged, interest in visiting the site diminished; the last tours of the MCC were offered in 1995 (Gruenbaum 2009). In autumn of 1999, the original control room consoles and equipment, including the world map (Mission Status and Tracking Board), were removed from the MCC and relocated at the new ESE exhibit at the KSC Visitor Complex, managed by Delaware North. The Flight Control Area of the Cape MCC has been vacant since late 1999. In 2004, a Condition Assessment (architectural and engineering survey), prepared by BRPH Architects Engineers, Inc. of Melbourne on behalf of Delaware North, documented the deteriorated condition of the building, as well as the costs associated with the needed repairs.

In early October 2008, Doug Fisher (NASA) and Daniel Gruenbaum (Delaware North) inventoried historic artifacts contained within the MCC, including signage, lighting, and

heating, ventilation and air conditioning (HVAC) fixtures. Several of these artifacts were removed, catalogued, and placed in storage in Room 2427 of the Public Affairs Office at the KSC Visitor Complex. Removed artifacts included one trash can, three exit lights, two thermostats, one fire bell, three signs, five intercom speakers of wood (two) and metal (three), and a wall-mounted plywood board for a fire extinguisher. In addition, two ceiling vents and four ceiling-mounted speakers were salvaged and placed in storage in Delaware North's exhibit storage cage at the Visitor Complex. A summary table listing all catalogued artifacts from the MCC, including the consoles and equipment currently on display at the ESE exhibit, is provided in **Appendix A**.

THE MCC FLIGHT CONTROL AREA

The control room at the Cape MCC was designed and developed by Bell Telephone Labs, Inc. (Swenson et al. 1966:217). As noted in the previous section, the Flight Control Area was active between November 1960 and November 1966 in support of the Mercury and Gemini programs. Historical photographs and other images, as well as drawings and figures, illustrate the changes in the overall layout of the control room, and the configuration of consoles and equipment during Project Mercury and the subsequent Gemini program. Photographs 2 through 6 illustrate the general layout of the control room at various times during its period of significance in the early to mid-1960s. Photographs 7 and 8 show the existing conditions at the time of the historic artifact inventory in March 2009. Figures depicting the room layout during the Mercury and Gemini programs, as well as a general comparison, are provided in **Appendix B**.



Photo 2. Mission control room during MR-3, May 1961

(Source: NASA 61-MR3-95). *Note placement of consoles and desks, world map, trend charts, plot boards, and pattern of ceiling lights, HVAC fixtures, and small audio speakers.*



Photo 3. View (undated) of the mission control room during Project Mercury (Source: NASA P-06436). *Note the four plot boards on left side of room, world map with circles depicting tracking stations, and trend charts to the right of the world map. Also note three orbital paths on the world tracking map.*

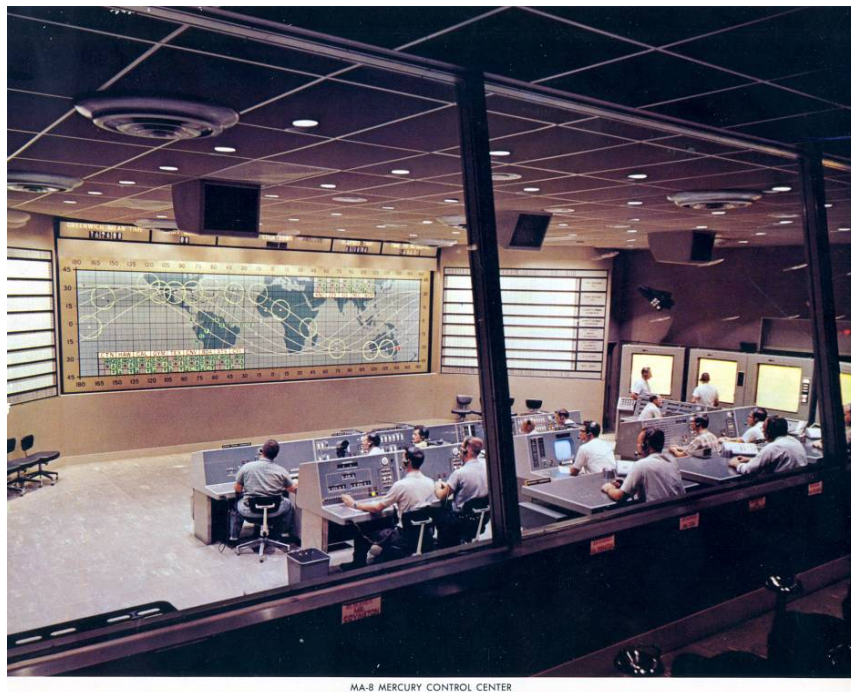


Photo 4. Mission control room during MA-8, October 1962 (Source: NASA P-06426.jpg). *Note televisions mounted across the ceiling, slanted glass partition, and partial view of Visitors Area with chairs and ashtrays. Also note six orbital paths on the world tracking map.*



Photo 5. Mission control room during MA-9, May 1963

(Source: NASA 63-MA9-164). *Note new rear projection panel, that replaced the trend charts, flanking the world map.*



Photo 6. Mission control room during Gemini (I or II) mission, 1964

(Source: NASA KSC-64C-861). *Note the five plot boards and rear projection panels. Also note the elevated platforms supporting the second row of consoles, and the rear row of desks, plus floor covering and ceiling light pattern.*



Photo 7. Looking west, northwest across the mission control room, March 2009
 (Source: ACI Photo 13, March 2009). *Not the overall support structure for the world map, the rear projection panels, floor covering, and ceiling light pattern.*



Photo 8. Looking east-northeast across the mission control room, March 2009
 (Source: ACI Photo 47, March 2009). *Note the slanted glass partition and floor platforms. Railings in Viewing Area are non-historic features constructed for the MCC visitor's tour.*

INVENTORY OF HISTORIC ARTIFACTS

In March 2009, Joan Deming and Trish Slovinac inspected the historic artifacts which remain in the Flight Control Area (Room 253), as well as the adjacent historically significant rooms, which include the Flight Control Briefing Room (Room 221), the NST Room (Room 222), Data Analysis Room (Room 223), the Raised Viewing Area (Room 250), plus the north corridor (221A). In addition, the Gemini Training Room (Room 211) and the Telemetry & Capsule Communications (Room 231) and other areas on Figure 1 within the MCC areas (Figure 1) were checked for the presence of additional artifacts.

As a result, in cooperation with NASA and Delaware North personnel, ACI identified a number of historic artifacts, as well as architectural design elements. **Table 1** provides a list of inventoried historic artifacts and architectural elements, and their location. A brief description of each follows, along with photographs.

Table 1. Inventory of Historic Artifacts within the MCC.

ARTIFACT	LOCATION
World map sliding arms/track	Room 253, west side (front)
Electrical panel/Rheostat	Support Area, southwest part
Electrical cabinet	Support area, northwest part
Rear projection screens (2)	Room 253, west side
Projector and mirror	Support Area Room 253, SW corner behind the tracking map
Doors (3)	Room 253, west side, southwest and northwest corners; east side, northeast corner
Door to Gents Room	Southeast of Flight Control Area
Electrical panel	Room 253, south end of east wall
Fire alarm pull and fire alarm bell	Room 253, north wall
Thermostat boxes (5)	Room 253, south wall (2); Viewing Area, south wall (1), north wall (1); Room 222, north wall
Signs: Room number panels (10)	Outside of Rooms 221, 222, 223, 250 and 253
Sign: "Please Keep Hands Off Screen"	Room 253, below left rear projection screen
Sign: Fire extinguisher	Room 213
Signs: NASA "Meatball" logo (3)	MCC exterior, north, south and east elevations
Audio speakers	Room 253 ceiling
Intercom speaker boxes (5)	Room 223 (1); Room 222 (3); Room 221 (1)
HVAC diffusers (8)	Room 223 (4); Room 221 (4)
Lighting Fixtures (e.g., recessed "can" lights; pendant lights; globe fixtures, etc.)	Room s 221, 222, 223, 253, and 221A north corridor
Viewing windows (5)	Separates the Flight Control Area (Room 253) from the Raised Viewing Area (Room 250)
Wall covering and decorative metal strip	Room 253
Floor tile	Room 253
Plot Boards (3)	Gemini Training Room (Room 211)
Consoles (3)	Gemini Training Room (Room 211)
Misc. console components	Gemini Training Room I (Room 211) and Telemetry & Capsule Communications (Room 231)

World map sliding arms/tracks

The two sliding arms/tracks (**Photo 9**) are located in the front (west side) of the Flight Control Area. There are two horizontal tracks that are mounted back-to-back and extend for the entire length of the map. The tracks allowed the sliding arms to move “east to west” along the map. Attached to each track is a moveable arm, one of which held a model capsule, on the control room side, the other, on the support area side, a small dot to indicate the landing site. (Videos of the Mercury missions depict the models as flat and red in color. The ESE exhibit displays a black 3-D model of the capsule only.) The arms are attached to their respective track through a motor box (**Photo 10**) that controlled the movement of the arm horizontally along the track, and the capsule/dot vertically along the pulley system. (The pulley system is no longer intact.) The original light harnesses that illuminated the tracking stations (circles) and other features of the world map are still extant, and located behind the original world map on display at the ESE exhibit.



Photo 9. World map sliding arm mechanisms, looking west
(Source: (ACI Photo 33, March 2009).



Photo 10. Detail of motor box for world map sliding arm mechanisms, looking northwest
(Source: ACI Photo 46, March 2009).

Electrical Panel/Rheostat

The electrical panel for the world map sliding arms sits at the base of the partition towards the south end. Its accompanying rheostat (**Photo 11**), which regulated electrical currents, is located to the rear of the control panel in the Support Area.

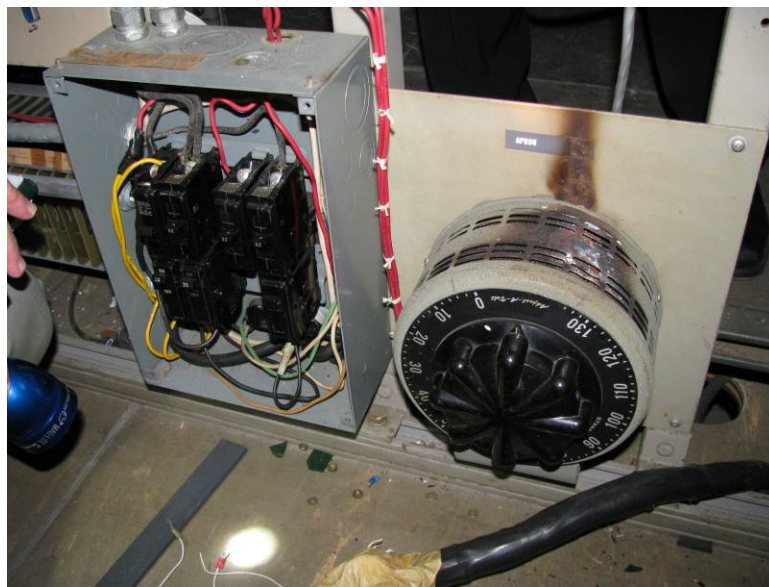


Photo 11. Rheostat for world map operation, looking northeast
(Source: ACI Photo 21, March 2009).

Electrical cabinet

This artifact is a large, free-standing electrical cabinet (**Photo 12**) that is currently sitting in the northwest area of the Support Area. The top third of the cabinet contains two series of push connectors; the lower two-thirds contain screw connectors. It retains much of its original bundled wiring, as well as hand-written notes. The notes suggest that this cabinet may have supported the time displays above the world map. A plate along the front above the doors indicates that the shell was supplied by Jones Machine Company; the wiring was most likely done by Stromberg-Carlson, as implied in documents prepared by Western Electric Company, Inc. (Western Electric Company, Inc. 1960: Table 2-3).

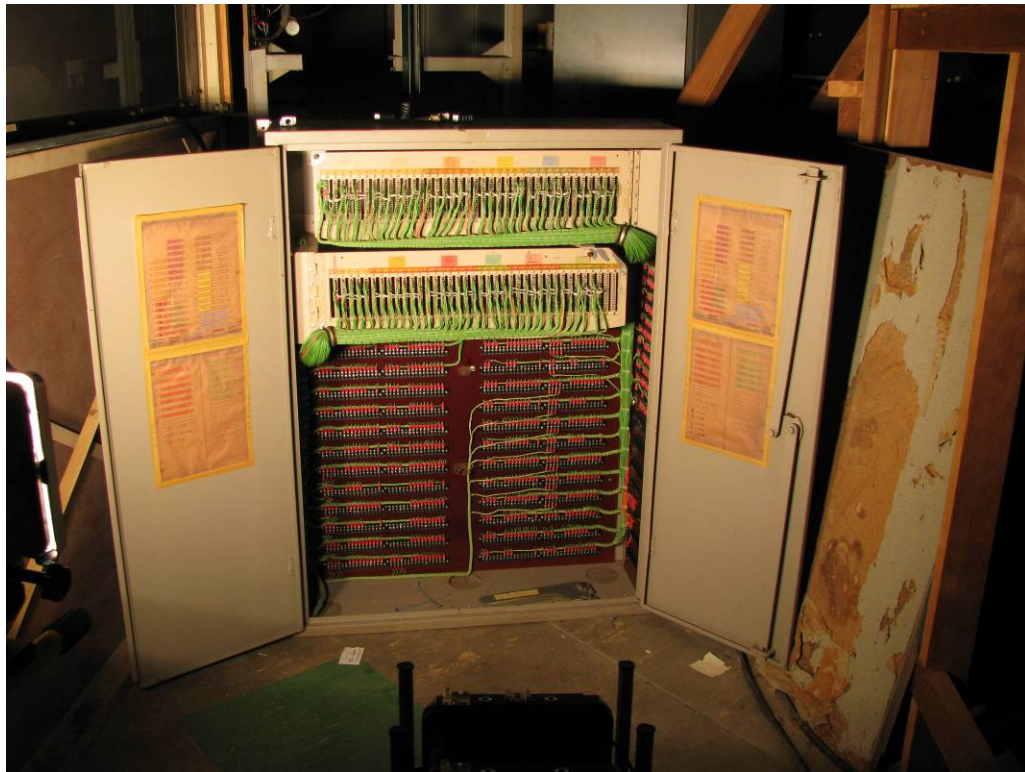


Photo 12. Electrical cabinet located in the Support Area, looking southwest
(Source: ACI Photo 48, March 2009).

Rear projection screens

Following the Mercury mission (MA-8) in October 1962, modifications to the MCC were initiated to support the upcoming Project Gemini. Among the changes was the replacement of the original Mercury-era trend charts with rear projection panels. These backlit screens were first used during MA-9, the last mission of the Mercury program. The left rear projection screen has dimensions of 8' x 8'; the right is 8' x 10'. No identifying tags were observed on the two inventoried screens. The left rear projection screen has a plate labeled "Jones Machine Co. Steel and Supplies, Merritt Island." Strips of adhesive tape are attached to each screen surface (**Photo 13**). While unverified, it is probable that the tape was used to affix the "show" display charts that are now part of the ESE exhibit. Three backlit panels, incorporated into the ESE exhibit since 1999, are listed in the NASA Custodian Account Property Report for 1997. Model No. 1A88400-1 was manufactured by the McDonnell Douglas Corporation; Models 75M15802 and 75M15803 were manufactured by KSC. [Note: The original trend charts are no longer extant, and ACI's informants were unable to provide information about their disposition.]



Photo 13. Rear projection screen to left side of world map, looking southwest

(Source: ACI Photo 110, March 2009). *Note adhesive tape strips on screen surface, and sign ("Please Keep Hands Off Screen") below the panel (See Photo 30). The trend chart to the left of the screen is not historic. It was built for the tour.*

Projector and mirror

The projector (**Photo 14**) is located atop a metal and wooden platform in the southwest corner of the Support Area. While not original to Project Mercury, its location is depicted in the architectural plans for the 1962-1963 building modifications, thus suggesting its use during the Gemini program (NASA LOC 1964:A-1). The projector is stamped with the date 1/13/61, and labeled with this information: “Model C6831, Projection Optics Co., Inc., N.J. Distributed by Technifax Corporation, Bendix Corporation.” It is tagged with the NASA ECN #653711. According to the NASA Custodian Account Property Report for 1997, the projector was manufactured by James River Graphics Tech. The projector’s companion mirror, which measures approximately 4’ x 4’, is mounted to the south wall. This mirror directed the images on the projector to the rear projection panel.



Photo 14. Projector and mirror located in the Support Area, looking southwest (Source: ACI Photo 44, March 2009).

Doors in Room 253

Two wood doors with brass handles, which flanked the Mercury-era trend charts, provided access between the Flight Control and Support Areas. The aluminum trim around each door and door surround (**Photo 15**) is the same architectural design feature used along the Flight Control Area walls. A small door of similar design (**Photo 16**) is located along the east wall near the northwest corner of the room. This door provided access to the cabling tunnels beneath the Raised Viewing Area.



Photo 15. Door to right of the world map, looking west (Source: ACI Photo 18, March 2009).



Photo 16. Small door near northeast corner of Room 253, looking east (Source: ACI Photo 20, March 2009)

Door to Gents Room (Room 246)

The men's restroom is located to the southeast of the historically significant portion of the MCC. The door to the "Gents Room" (**Photos 17 and 18**) is 2'-6" wide by 7'-0" high. It is composed of a wood core with aluminum facing, and dates to the original building. In the upper half are three glass panes with aluminum frames, stacked vertically; the center pane contains an applied "MEN" sign (similar to the room number signs), as well as a hand painted "Gents." The lower half of the door contains an aluminum ventilation louver.



Photo 17. Door to men's bathroom, facing northeast
(Source: ACI Photo 9, March 19, 2009).



Photo 18. Detail of men's bathroom door front, facing northeast
(Source: ACI Photo 41, March 4, 2009).

Electrical panel

A large electrical panel (**Photo 19**) is located along the east wall of Room 253, near the south end. This panel provided the controls for the lighting throughout the Flight Control Area, either through the circuit breakers (to the left) or the dimmer controls (knobs to the right).



Photo 19. Electrical panel at the rear of Room 253, looking east
(Source: ACI Photo 36, March 2009).

Fire alarm pull and fire alarm bell

These artifacts (**Photos 20 and 21**) are located on the north wall of Room 253. The alarm pull was manufactured by Sperti Faraday, Inc. of Adrian, Michigan; the fire bell was made by Simplex in Gardner, Massachusetts. The alarm pull may be associated with the bell previously salvaged by Fisher and Gruenbaum (Artifact # 1507).



Photo 20. Fire alarm pull located on the north wall of Room 253, looking north
(Source: ACI Photo 21, March 2009).



Photo 21. Fire alarm bell located on the north wall of Room 253, looking north
(Source: ACI Photo 28, March 2009).

Thermostat boxes

Two thermostat boxes, manufactured by Honeywell, are located side-by-side on the south wall of the Flight Control Area (**Photo 22**), and another of the same model (**Photo 23**) is located on the south wall of the Raised Viewing Area. Another two, also by Honeywell, are located along the north wall of the Raised Viewing Area and the north wall of Room 222 (**Photo 24**). These two are identical to the gold-painted covered metal boxes (Artifact #'s 1505 and 1506) salvaged and catalogued by Fisher and Gruenbaum in October 2008, and currently in storage in Room 2427 of the Public Affairs Office at the KSC Visitor Complex. These artifacts measure approximately 5" high x 3" wide x 2-1/2" in depth.



Photo 22. Location of two thermostat boxes on south wall of the Flight Control Area, looking south (Source: ACI Photo 108, March 2008).



Photo 23. Detail of thermostat box on south wall of Raised Viewing Area, looking south (Source: ACI Photo 134, March 2009).



Photo 24. Thermostat box in Room 222, looking north
(Source: ACI Photo 120, March 2009).

Room number signs

Numerous metal plate room number signs were observed in the MCC. However, only those associated with the historically significant rooms were inventoried. Of the total ten room number signs, two designate Room 253. One of these is located above the door on the south wall of Room 223 (**Photo 25**), and the other is on the north wall of Room 230.



Photo 25. Sign for Room 253, looking south
(Source: ACI Photo 116, March 2009).

Eight rectangular-shaped metal room number panels associated with historically significant rooms 221, 222, 223, and 250 also were identified. Representative photographs follow.



Photo 26. Sign for Room 221
(Source: ACI Photo 25, March 2009).



Photo 27. Sign for Room 221
(Source: ACI Photo 25, March 2009).



Photo 28. Sign for Room 223
(Source: ACI Photo 26, March 2009).



Photo 29. Sign for Room 250
(Source: ACI Photo 70, March 2009).

Sign: “Please Keep Hands Off Screen”

This metal sign (**Photo 30**) is located below the left rear projection screen.



Photo 30. Sign located below left screen of the world map, looking southwest
(Source: ACI Photo 109, March 2009).

Sign: Fire Extinguisher

This painted fire extinguisher sign (**Photo 31**) is located along the west wall of the former Gemini Training Room (Room 213), across the corridor from the Raised Viewing Area. The roughly square ¼” masonite sign measures 12” high by 11-3/4” wide. This artifact, “the last remaining sign of its kind” (Fisher 2009), is identical to Artifact #1509 (**Appendix A**) that was salvaged and catalogued in October 2008 by Fisher and Gruenbaum, and which is stored in Room 2427 of the Public Affairs Office at the Visitor Complex. It is also similar in overall design to another salvaged “For Fires Fire Ext.” sign (Artifact #1508) marked “Electrical Gasoline Oil Paint – Etc Carbon Dioxide” in black letters on a beige field.



Photo 31. Fire extinguisher sign located in Room 213, looking west
(Source: ACI Photo 141, March 2009).

Signs: NASA “Meatball” Logo

The NASA “meatball” logo, composed of a sphere, orbit, red chevron, and stars, was first designed in 1959. Three meatball logo signs are affixed to the north (**Photos 32-33**), south, and east (**Photo 34**) elevations of the MCC building. None is original. When compared with the design of the logo in place on the MCC in 1962 (**Photo 35**), the differences are evident. According to Doug Fisher (2009), the sign on the east elevation is the most like the original. Reportedly, the three meatball logo signs were installed “for show.” The date or dates of placement on the building was(were) unknown by the KSC and Delaware North informants.



Photo 32. View of NASA “meatball” logo sign on north elevation of the MCC, looking south (Source: ACI Photo 5, March 2009).



Photo 33. Close up view of “meatball” logo sign along north elevation of the MCC, looking south (Source: ACI Photo 6, March 2009).



Photo 34. Detail of “Meatball” logo sign on the east elevation
(Source: ACI Photo 7, March 2009). *Note the pattern of stars and other differences with an original sign, illustrated in Photo 35.*



Photo 35. Original signage and astronaut Scott Carpenter in front of MCC, May 15, 1962.
(Source: NASA KSC 62-MA7-55.jpg). *Note differences between this logo and Photo 34.*

Ceiling audio speakers

A few remaining ceiling-mounted audio speakers were observed in Room 253. A partial view of the remaining speakers is shown in **Photo 36**. The speaker cover plate (**Photo 37**) consists of a brushed aluminum assembly of nested concentric metal rings; the overall size is approximately 15-1/2" in diameter. They are Slimline High Fidelity speakers manufactured by Stromberg Carlson of San Diego, California. The speaker cover plate illustrated in Photo 37 is identical to Artifact #'s 1515, 1558, 1559, 1560, and 1561 previously removed by Fisher and/or Gruenbaum in October 2008. These catalogued artifacts are currently stored in Room 2427 of the Public Affairs Office at the KSC Visitor Complex.



Photo 36. Pattern of ceiling audio speakers in Room 253

(Source: ACI Photo 103, March 2009). *Also note the locations of recessed ceiling lights.*



Photo 37. Small ceiling-mounted audio speaker cover plate

(Source: ACI Photo 27, March 2009).

Intercom system speaker boxes

Five wall-mounted speaker boxes, elements of the original Western Electric intercom system, were identified in Rooms 221 (1), 222 (3), and 223 (1). The wood boxes are faced with fabric covering, and feature a control knob at the lower right (**Photo 38**). Each measures approximately 11" high x 10" wide x 6" deep. These artifacts are identical to the three speaker boxes removed from the MCC by Fisher and Gruenbaum in October 2008. These three were assigned the Artifact #'s 578, 1511, and 1512 (see **Appendix A**). Artifact # 578 was installed in the ESE display at the KSC Visitor Complex; #'s 1511 and 1512 are being stored in Room 2427 of the Public Affairs Office.



Photo 38. Intercom speaker box located in Room 223
(Source: ACI Photo 117, March 2009).

HVAC diffusers

According to the “Reflected Ceiling Plan” drawings (Burns and Roe, Inc. 1959:24), a total of eight HVAC diffusers were originally located in the Flight Control Area. All have been removed. Two of the removed artifacts were catalogued in 2008 as Artifacts #1556 and 1557 (**Appendix A**); they are currently in the Delaware North exhibit storage cage. These silver-painted, formed metal diffusers are composed of two parts: an outer circle and a center composed of three concentric rings. Identical to the two salvaged artifacts are eight HVAC diffusers identified by ACI in Rooms 221 (4) and 223 (4). A representative artifact is depicted in **Photo 39**.



Photo 39. HVAC diffuser in Room 221, looking northwest
(Source: ACI Photo 124, March 2009).

Lighting fixtures

The majority of ceiling light fixtures remaining in Room 253 are generic, recessed “can” lights. The original engineering drawings (Burns and Roe, Inc. 1959:24) indicate a grid pattern of 58 lights. The historically significant portions of the MCC, as well as adjacent rooms and corridors, contain a variety of lighting fixture types, including pendant lights and glass globes. Specifically, a total of 15 pendant lights, characterized by three tiers of concentric circles in graduated sizes, were identified in Room 221 (9) (**Photo 40**) and 223 (6). Frosted glass globe lights in several shapes were also identified along the corridors (**Photo 41**).



Photo 40. Pendant lights in Room 221
(Source: ACI Photo 126, March 2009). *Also note HVAC diffuser.*



Photo 41. Globe lights in 221A corridor near Rooms 221 and 222, looking west
(Source: ACI Photo 64, March 2009).



Photo 42. Close-up of center globe light in 221A corridor, looking west
(Source: ACI Photo 63, March 2009).

Viewing windows and framing

Separating the Flight Control Area from the Viewing Area at the east side of Room 253 is a partition of slanted glass windows framed in metal (**Photo 43**). Each of the five windows is composed of two sheets of $\frac{1}{4}$ -inch polished glass, and measures 7'-6" high by 10' wide.



Photo 43. Slanted glass window partition, looking south
(Source: ACI Photo 24, March 2009).

Wall coverings and decorative metal strip

The north and south walls of Room 253 are covered with two different finishes, separated by a thin aluminum strip. The architectural plans specified Vicrtex Stip-L-Text, V275, in desert tan (Color 2111) for the lower half of the walls, and ¼-inch thick Curon covering in smoke gray (Color 1025) for the upper walls (Burns and Roe, Inc. 1959: Sheet 22). No documents confirming the use of these specific finishes could be found, and a high degree of deterioration renders it impossible to determine the original colors. The aluminum strip also is used as a trim around the two doors at the west side of the Flight Control Area (cf. Photo 15).



Photo 44. South wall of the Flight Control Area showing wall coverings and aluminum strip, looking south (Source: ACI Photo 106, March 2009).

Floor tile

The raised floor of Room 253 is composed of removable panels, which were to be covered with 1/8" thick, ash taupe-colored, rubber tile (**Photo 45**) manufactured by the Armstrong Cork Company, as specified on the architectural plans (Burns and Roe, Inc. 1959: Sheet 22). No documentation confirming the use of these specific tiles could be found. The removable panels measure roughly 4' x 3', and have an aluminum edging.



Photo 45. Floor tile in the Flight Control Area, looking west
(Source: ACI Photo 101, March 2009).

Plot boards (X-Y recorders)

Three Plot boards (X-Y Recorders) (**Photos 46-48**) are located in the former Gemini Training Room (Room 211). All are Model 3010 X-Y Recorders manufactured by the Milgo Electronic Corporation (MEC) for IBM Corporation. Below each plotting board is a sloping front control panel. The third recorder (Photo 48), which could be closely examined, contains the power supply (Model 15-71A), Servo Amplifier (Model 15-31A), and Servo Supply (Model 15-72A). Historic photographs and other archival materials illustrate that four plot boards were located along the right hand side of the Flight Control Room during Project Mercury. A fifth unit was added during the Gemini program. Three of the original units, MEC X-Y Recorder Model 3010, are on display in the ESE exhibit.



Photo 46. X-Y Recorder B-2 located in the Gemini Training Room, looking west
(Source: ACI Photo 49, March 2009).



Photo 47. X-Y Recorder B-4 located in the Gemini Training Room, looking west
(Source: ACI Photo 50, March 2009).



Photo 48. Third X-Y Recorder located in the Gemini Training Room
(Source: ACI Photo 52, March 2009).

Consoles

Three upright consoles (**Photo 49**) are located in the Gemini Training Room. Identification tags were not visible. It is not known whether these are associated with either the Mercury or Gemini programs, and the function of each is unknown. The consoles at the left and right are each labeled “Patch Distributor;” the front of the middle console was not observable.



Photo 49. Consoles (of unknown function) in the Gemini Training Room
(Source: ACI Photo 140, March 2009).

Console components

A variety of different console components were identified in both the Gemini Training Room (Room 211) and the Telemetry & Capsule Communications (Room 231). Neither the specific functions nor the program affiliations are known. A representative sample of artifacts is depicted in **Photos 50-52**.

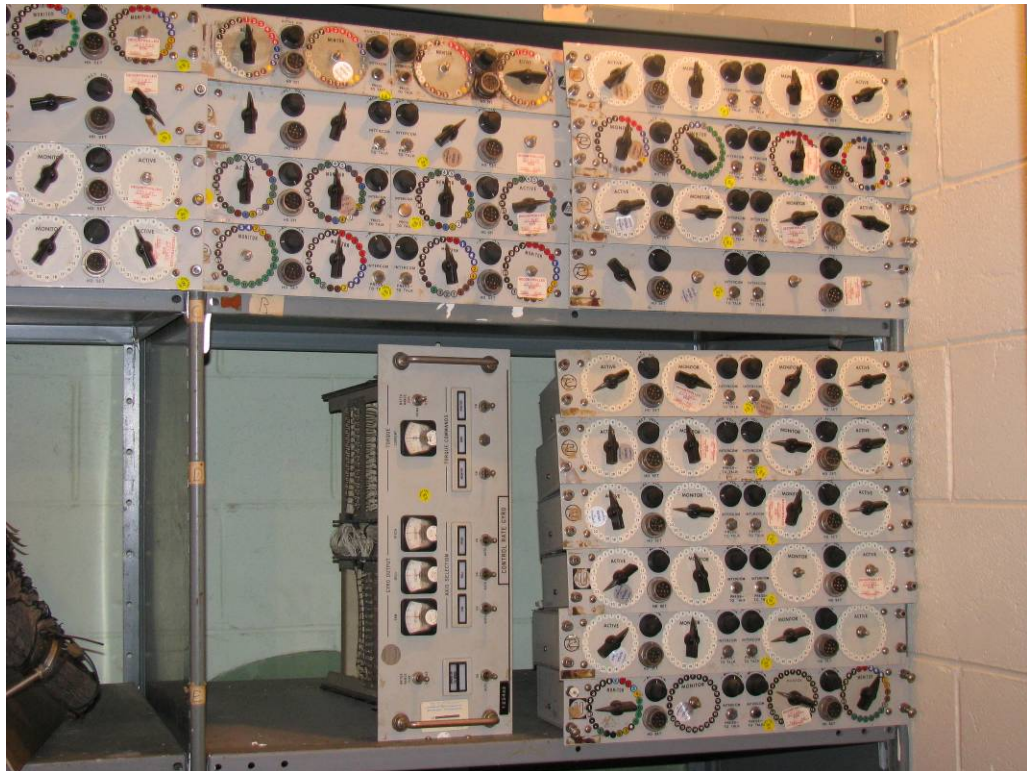


Photo 50. Console components in the Telemetry & Capsule Communications area
(Source: ACI Photo 151, March 2009).



Photo 51. Guidance Computer Panel located in the Telemetry & Capsule Communications
(Source: ACI Photo 144, March 2009).



Photo 52. Console components in the Gemini Training Room
(Source: ACI Photo 139, March 2009).

CONCLUSIONS AND RECOMMENDATIONS

The primary objective of the artifact inventory was to preserve the tangible remains of the original Cape MCC Flight Control Area and Raised Viewing Area, with a view towards their future use in interpreting the history of the mission control room, through new exhibits and other means.

Due to the 1999 removal of original consoles, equipment, and furnishings, plus the recent (October 2008) salvage of selected artifacts, including audio and intercom speakers, HVAC diffusers, exit lights, thermostats, and signage, little of the historic fabric of the MCC Flight Control Area remains in place. The 2009 inventory by ACI, supplemented by informant information and archival research, resulted in the identification of a number of artifacts and architectural finishes that are recommended for salvage, cataloging, and curation prior to the demolition of the MCC building. Some of these artifacts may be suitable for future use in a new exhibit; others have no evident or feasible interpretive value, but should be retained in view of their significance historical associations with the Mercury and/or Gemini programs.

The recommendations for artifact salvage take into consideration the totality of previously collected materials. For example, the Flight Control Area originally had eight HVAC diffusers mounted to the ceiling tiles, of which two have been removed, catalogued, and stored. Thus, salvage of six to eight remaining HVAC diffusers would enable recreation of the pattern of HVAC fixtures across the mission control room ceiling using original materials. The same approach was applied to the recommended retention of audio speaker assemblies.

Beginning in 1967, the MCC was included as part of a guided tour. While no photographic documentation of the modification process could be found, informants provided information about certain changes that were made to the Flight Control Area and Raised Viewing Area to support the tour show. Among the most major changes was the removal of furnishings from the Raised Viewing Area, and the installation of new guardrails and controls for the projection and sound system. As a result, with the exception of two thermostats within the Raised Viewing Area, no noteworthy historic artifacts were identified within this area.

The following artifacts are recommended for salvage and curation:

- Two swing arm mechanisms and associated motor box
- Rheostat for the world map
- Electrical cabinet in the Support Area
- Electrical panel at the rear of Room 253
- Projector and mirror
- Two rear projection screens
- Two wood doors from Room 253 (to each side of the world map)

- Gent's Room door, Room 246
- Four thermostat boxes (two from south wall of Flight Control Area; two from Raised Viewing Area)
- Fire alarm pull
- Fire extinguisher sign
- 10 room number signs (for Rooms 221, 222, 223, 250, and 253)
- One NASA meatball logo sign
- Three plot boards (X-Y Recorders)
- All remaining audio speaker assemblies with plate cover from the ceiling of the Flight Control Area
- Six HVAC diffusers (from Rooms 221 and 223)

In addition, a **sample** of the following lighting fixtures and architectural finishes are recommended for salvage:

- Four pendant lights from Room 221 and/or 223
- One or two globe light fixtures from the North Corridor (221A)
- Sample of upper and lower vinyl wall coverings
- Sample of aluminum strip separating upper and lower wall coverings
- Sample of floor tile

While unquestionably a distinguishing feature of the historic mission control room and adjacent viewing area, the slanted glass partition, in its entirety, is not recommended for salvage. The ¼" glass panes are commonly available, and can easily be replaced in-kind. However, if inspection of the framing indicates that it is not gasketed, and, if feasible, the framing system is recommended for salvage, storage, and possible interpretive use in an interpretive exhibit.

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**APPENDIX A: 2008 Inventory of Artifacts Removed from the MCC
(from Fisher and Gruenbaum, 2009).**

Appendix A: 2008 Inventory of Artifacts Removed from the MCC (from Fisher and Gruenbaum, 2009).

Artifact No./ Object ID No.	Artifact Name/NASA Real Property No.	Description	Location	Status date
531/ 2008.0.04	Plot Board No. 1/ 1979454	Gray metal vertical console with slanted control surface. Stromberg Carlson and Bell Telephone Laboratories, Inc. X-4 Recorder Model 3010	ESE	6/27/08
532/ 2008.0.25	Plot Board No. 2/ 653723	Gray metal cabinet with backlit display and controls on slanted surface. Made by Electronic Association, Inc. and RCA (made for the AF Missile Test Center) Veriplotter Model 205 J, Plotting Board Control Cabinet Model # RCA 1000	ESE	6/27/08
533/ 2008.0.26	Plot Board No. 3/ 653724	Gray, metal, vertical cabinet with backlit display and controls. Stromberg Carlson and Bell Telephone Labs, Inc.	ESE	No date
534/ 2008.0..27	Retro console/ 653720	Horizontal, gray metal with desk surface and slanted controls. Stromberg Carlson and Bell Telephone Labs, Inc.	ESE; row in front of recorders	6/27/08
535/ 2008.0..28	Sanborn Recorder #1/ 653719	Horizontal gray metal cabinet with slanted controls and horizontal paper chart. Sanborn, Co. Waltham, MA. Model #958B-600	ESE Row 1	6/27/08
536/ 2008.0..29	Console	Horizontal gray cabinet with slanted controls and desk surface. Stromberg Carlson	ESE Row 1; next to Sanborn Recorder	6/27/08
537/ 2008.0..30	Console	Horizontal gray cabinet with slanted controls and desk surface. Stromberg Carlson	ESE Row 1; 3 rd from right	6/27/08
538/ 2008.0..31	Mission Event Sequence Console/ 653716	Horizontal gray cabinet with slanted controls and desk surface with monitor. Stromberg Carlson	ESE Row 1; 4 th from right	6/27/08
539/ 2008.0..32	Altitude Maneuver Control (from GSFC #180438)/ 653715	Horizontal gray cabinet with slanted controls and desk surface. Stromberg Carlson	ESE Row 1; 5 th from right	6/27/08
540/ 2008.0..33	Environmental Monitor/ 653714	Horizontal gray cabinet with slanted controls and desk surface with monitor. Stromberg Carlson	ESE Row 1; 6 th from right	6/27/08
541/ 2008.0..34	Sanborn Recorder No. 2/ 653713	Horizontal gray metal cabinet with slanted controls and horizontal paper chart. Sanborn, Co. Waltham, MA. Model 958B-600	ESE Row 1; 7 th from right	6/27/08

Artifact No./ Object ID No.	Artifact Name/NASA Real Property No.	Description	Location	Status date
542/ 2008.0..31	Network Status Console/ 653725	Horizontal gray cabinet with slanted controls and desk surface. Stromberg Carlson	ESE Row 2; 1 st on right	6/27/08
543/ 2008.0.36	Network Status and Liftoff Clock Console/ missing	Horizontal gray cabinet with slanted controls and desk surface. Stromberg Carlson	ESE Row 2; 2 nd from right	6/27/08
544/ 2008.0.37	Mission Event Sequence Console/ missing	Horizontal gray cabinet with slanted controls and desk surface. Stromberg Carlson	ESE Row 2; center	6/27/08
545/ 2008.0.38	Abort Control Console/ missing	Horizontal gray cabinet with slanted controls and desk surface. Stromberg Carlson	ESE Row 2; 4 th from right	6/27/08
546/ 2008.0.39	Recovery Status Console/ missing	Horizontal gray cabinet with slanted controls and desk surface. Stromberg Carlson	ESE Row 2; 5 th from right	6/27/08
547/ 2008.0.40	Desk (54" W x 29" H x 30" deep)	Gray metal with slab legs and vanity panel. Stromberg Carlson	ESE Row 3; 1 st on right	6/27/08
548/ 2008.0.41	Desk (53 3/4" W x 29" H x 30" deep)	Gray metal with slab legs and vanity panel. Stromberg Carlson	ESE Row 3; 3 rd from left	6/27/08
549/ 2008.0.42	Desk (36" W x 29" H x 30" deep)	Gray metal with slab legs and vanity panel. Stromberg Carlson	ESE Row 3; 2 nd from left	6/27/08
550/ 2008.0.43	Desk (54" W x 29" H x 30" deep)	Gray metal with slab legs and vanity panel. Stromberg Carlson	ESE Row 3; 1 st on left	6/27/08
551/ 2008.0.44	Mission Events Sequence Console/ missing	Horizontal gray metal console with desk top surface. Most of the controls have been recorded. Stromberg Carlson	ESE; left side of room	6/27/08
552/ 2008.0.45	Mission Status Display (world map) (299" W x 117" H)/ 653751	Large formed backlit display of mission status sharing longitude and latitude and project flight path	ESE; front of room	6/27/08
553/ 2008.0.46	Telephone	Yellow plastic, rotating style, no dial. Western Electric	ESE Row 3; Desk 1 (No. 547)	6/27/08
554/ 2008.0.47	Telephone	Black plastic rotary. Western Electric	ESE; desk 3 rd from the left	6/27/08
555/ 2008.0.48	Telephone	Black plastic rotary with dial and push button extensions. Western Electric	ESE; 2 nd desk from left (No. 549)	6/27/08
556/ 2008.0.49	Telephone	Yellow plastic, rotating style, no dial. August 1962, Western Electric	ESE; 1 st desk on left (No. 550)	6/27/08
557/2008.0.50 558/2008.0.51	Telephone Switches (2)	Gray metal slanted box with push buttons	ESE; Desk 1 on right (No. 547)	6/27/08
559/ 2008.0.52	Switch Box	Red "hold" button and green "proceed" button	ESE; 2 nd desk from right (No. 548)	6/27/08
560/ 2008.0.53	Switch Box	6 buttons (with numerals)	ESE; #.41 desk	6/27/08
561/ 2008.0.57	Switch Box	6 buttons (with numerals)	ESE; desk 3 from right (No. 549)	6/27/08

Artifact No./ Object ID No.	Artifact Name/NASA Real Property No.	Description	Location	Status date
562/ 2008.0.58	Ashtray	Hand-painted ceramic white with blue accents "First Space Congress 1964" Canaveral Council Technical Society with atomic emblem	ESE; desk #548	6/27/08
563/.60, .61, .62, .63, .64, .65, .66, .67, .68, .69, .70, .71, (#574)	Chair (N=12)	Metal frame chair with leather cushion and back rest. Made by Knoll Associates, Inc., NY, NY	ESE	6/27/08
575/ 2008.0.72	Chair	Black upholstered with metal frame and arm rests. Made by Knoll Associates, Inc., NY, NY	ESE	6/27/08
576/ 2008.0.73 (#576)	Mission Status Display	"Switches" backlit panel	ESE	6/27/08
577/ 2008.0.74	Mission Status Display	Backlit panel – "PRI GUID" SEC GUID, GUID BSE, GUID BSE	ESE	6/27/08
578/ 2008.0.75	Speaker	Intercom speaker with volume control, wooden box with fabric face	ESE; upper wall	6/27/08
1501	Trash can	Made by Witt Company	XA-Room 2427 Visitor Complex (VC)	DF, DG – cataloged 10/2/08
1502	Exit light	Bronze ring with red glass dome "EXIT" lens - 1950	XA-Room 2427 VC	DF, DG – cataloged 10/2/08
1503	Exit light	Bronze ring with red glass dome "EXIT" lens - 1950	XA-Room 2427 VC	DF, DG – cataloged 10/2/08
1504	Exit light	Bronze ring with red glass dome "EXIT" lens - 1950	XA-Room 2427 VC	DF, DG – cataloged 10/2/08
1505	Thermostat	Metal cover, painted gold, bi-metal mechanism from temperature adjustment by Honeywell	XA-Room 2427 VC	DF, DG – cataloged 10/2/08
1506	Thermostat	Metal cover, painted gold, bi-metal mechanism from temperature adjustment by Honeywell	XA-Room 2427 VC	DF, DG – cataloged 10/2/08
1507	Fire bell	Red metal dome shape bell from MCC Cat. #2000. Made by Sperti Faraday, Inc., Adrian, MI	XA-Room 2427 VC	DF, DG – cataloged 10/2/08
1508	Sign	¼ masonite, painted. Red background with beige circle interior. Red lettering for "FOR FIRES FIRE EXT." Black lettering "ELECTRICAL GASOLINE OIL PAINT- ETC. CARBON DIOXIDE"	XA-Room 2427 VC	DF, DG – cataloged 10/2/08

Artifact No./ Object ID No.	Artifact Name/NASA Real Property No.	Description	Location	Status date
1509	Sign	¼ masonite, painted. Red background with beige circle interior. Red lettering for “FOR FIRES FIRE EXT.” Black lettering “ELECTRICAL GASOLINE OIL PAINT- ETC CARBON DIOXIDE” Black lettering “WOOD PAPER, TRASH ETC. WATER TYPE	XA-Room 2427 VC	DF, DG – cataloged 10/2/08
1510	Sign	1/8” aluminum sign. White background with red lettering “No Smoking in Viewing Room”	XA-Room 2427 VC	DF, DG – cataloged 10/2/08
1511 & 1512	Intercom Speaker	Birch enclosure with slanted front, cloth covered grille and black painted knob for volume control	XA-Room 2427 VC	DF, DG – cataloged 10/2/08
1513 & 1514	Intercom Speaker	Circular brushed aluminum speaker assembly. Installed in hallway, MCC #1514 has volume control on button	XA-Room 2427 VC	DF, DG – cataloged 10/2/08
1515	Intercom Speaker	Brushed aluminum assembly of nested ceramic metal rings. Mounted in ceiling in control room	XA-Room 2427 VC	DF & DG 10/6/08
1516	Board	Red painted wall-mounted plywood board for fire extinguisher. Goes with artifact #1508 red mounting bracket	XA-Room 2427 VC	DF & DG 10/6/08
1556 & 1557	Vent (2) (from MCC ceiling)	Round HVAC vent, ceiling mounted, formed metal painted silver – 2 pieces – center made of concentric rings. Center will be #1556B	Exhibit storage cage	DG 10/13/09
1558, 1559, 1560, 1661	Speaker (4); ceiling mounted (from MCC ceiling)	Audio speaker, ceiling mounted, consisting of steel, round box, transformer, speaker and cover plate (8” speaker). Cover plate consists of 4 concentric rings of brushed aluminum. Slimline High Fidelity Speaker by Stromberg Carlson	Exhibit storage cage	DG 10/13/09



P P Pics 531a.jpg



P P Pics 531b.jpg



P P Pics 532a.jpg



P P Pics 532b.jpg



P P Pics 532c.jpg



P P Pics 533a.jpg



P P Pics 533b.jpg



P P Pics 533c.jpg



P P Pics 534a.jpg



P P Pics 534b.jpg



P P Pics 535a.jpg



P P Pics 535b.jpg



P P Pics 536.jpg



P P Pics 537.jpg



P P Pics 538.jpg



P P Pics 539.jpg



P P Pics 540.jpg



P P Pics 541a.jpg



P P Pics 541b.jpg



P P Pics 542a.jpg



P P Pics 542b.jpg



P P Pics 543a.jpg



P P Pics 543b.jpg



P P Pics 544.jpg



P P Pics 545.jpg



P P Pics 546a.jpg



P P Pics 546b.jpg



P P Pics 547.jpg



P P Pics 548.jpg



P P Pics 549.jpg



P P Pics 550.jpg



P P Pics 551.jpg



P P Pics 552a.jpg



P P Pics 552b.jpg



P P Pics 553.jpg



P P Pics 554.jpg



P P Pics 555.jpg



P P Pics 556.jpg



P P Pics 557.jpg



P P Pics 558.jpg



P P Pics 559.jpg



P P Pics 560.jpg



P P Pics 562.jpg



P P Pics 563a.jpg



P P Pics 563b.jpg



P P Pics 564a.jpg



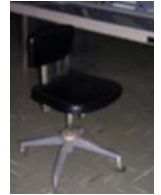
P P Pics 564b.jpg



P P Pics 565a.jpg



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P P Pics 566a.jpg



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P P Pics 567a.jpg



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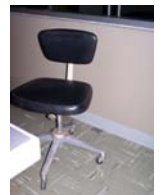
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P P Pics 570a.jpg



P P Pics 570b.jpg



P P Pics 571a.jpg



P P Pics 571b.jpg



P P Pics 572a.jpg



P P Pics 572b.jpg



P P Pics 574a.jpg



P P Pics 574b.jpg



P P Pics 575a.jpg



P P Pics 575b.jpg



P P Pics 576 and 577.jpg



P P Pics 578.jpg



PP 561.jpg



PP 573.jpg



PP Pics 1501.jpg



PP Pics 1502a.jpg



PP Pics 1502b.jpg



PP Pics 1503.jpg



PP Pics 1504.jpg



PP Pics 1505a.jpg



PP Pics 1505b.jpg



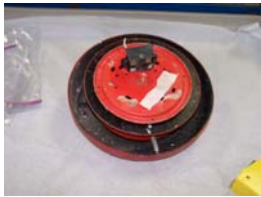
PP Pics 1506a.jpg



PP Pics 1506b.jpg



PP Pics 1507a.jpg



PP Pics 1507b.jpg



PP Pics -1508.jpg



PP Pics -1509.jpg



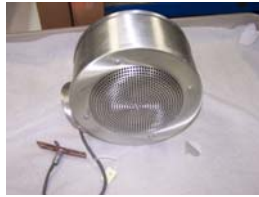
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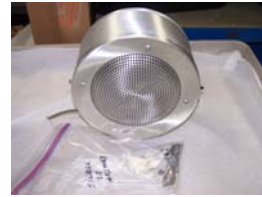
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PP Pics -1512.jpg



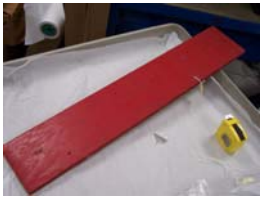
PP Pics -1513.jpg



PP Pics -1514.jpg



PP Pics -1515.jpg



PP Pics -1516a.jpg



PP Pics -1516b.jpg



PP Pics -1517.jpg



PP Pics -1556a.jpg



PP Pics -1556b.jpg



PP Pics -1557a.jpg



PP Pics -1557b.jpg



PP Pics -1558.jpg



PP Pics -1559.jpg



PP Pics -1560.jpg



PP PICS - 1561.jpg

APPENDIX B: MCC Flight Control Area Configuration

Historical photographs and other images, as well as drawings and figures, illustrate the changes in the overall layout of the MCC Flight Control Area, and the configuration of consoles and equipment during the Mercury and Gemini programs (Figures B-1 and B-2). Table B-1 provides a comparison of console locations during each program.

Table B-1. Comparison of Flight Control Room Console and Equipment Layout, Mercury and Gemini Projects.

RELATIVE POSITION	PROJECT MERCURY	PROJECT GEMINI
Row 1 Position (left to right)		
1	Support control coordinator	Sanborn recorder
2	Sanborn recorder	Flight surgeon
3	Flight surgeon	Spacecraft systems engineer
4	Spacecraft environment monitor	Spacecraft communicator
5	Sanborn recorder	Booster systems engineer
6	Spacecraft communicator	Spacecraft systems engineer
7	Spacecraft system monitor	Sanborn recorder
Row 2 Position (left to right)		
1	Recovery status monitor	O & P officer
2	Range safety observer	Assistant flight director
3	Flight director	Flight director
4	Network status monitor	Network controller
5	Missile telemetry monitor	(Spare)
6	Sanborn recorder	
Row 3 Position (left to right)		
1	Recovery commander (USN)	DoD staff member
2	Operations director	Public affairs officer
3	Network commander (USAF)	Operations director
4		DoD representative
Left side of room (Between Rows 1 and 2)		
1		Support control coordinator
2		Display coordinator
Right side of room (front to back)		
1	Retrofire controller	Retrofire controller
2	Flight dynamics officer	Flight dynamics officer
3		Guidance officer
Right side of room (along wall)		
	Four Plot boards	Five Plot boards

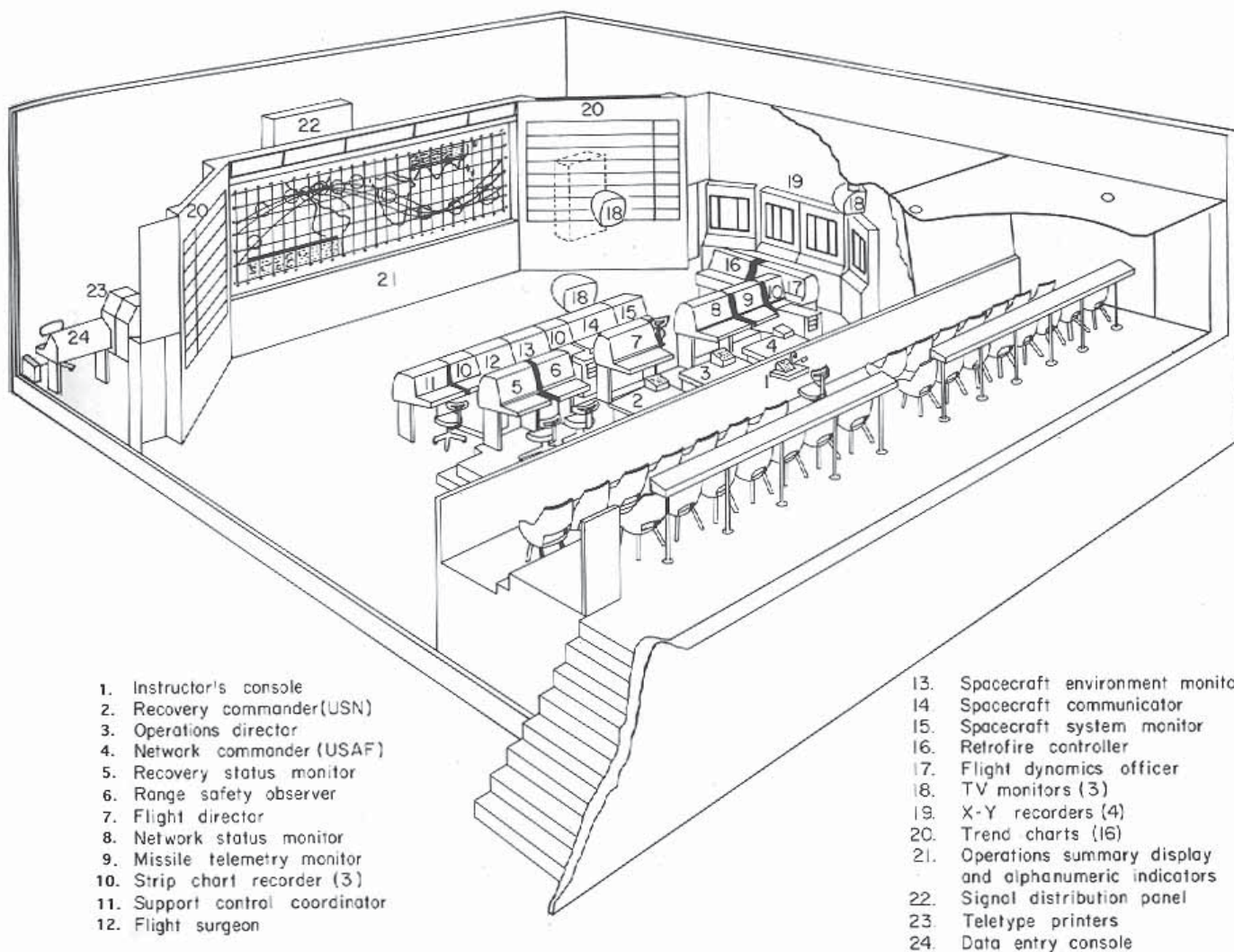


Figure B-1. Layout of the Flight Control Area during Project Mercury (KSC Archives).



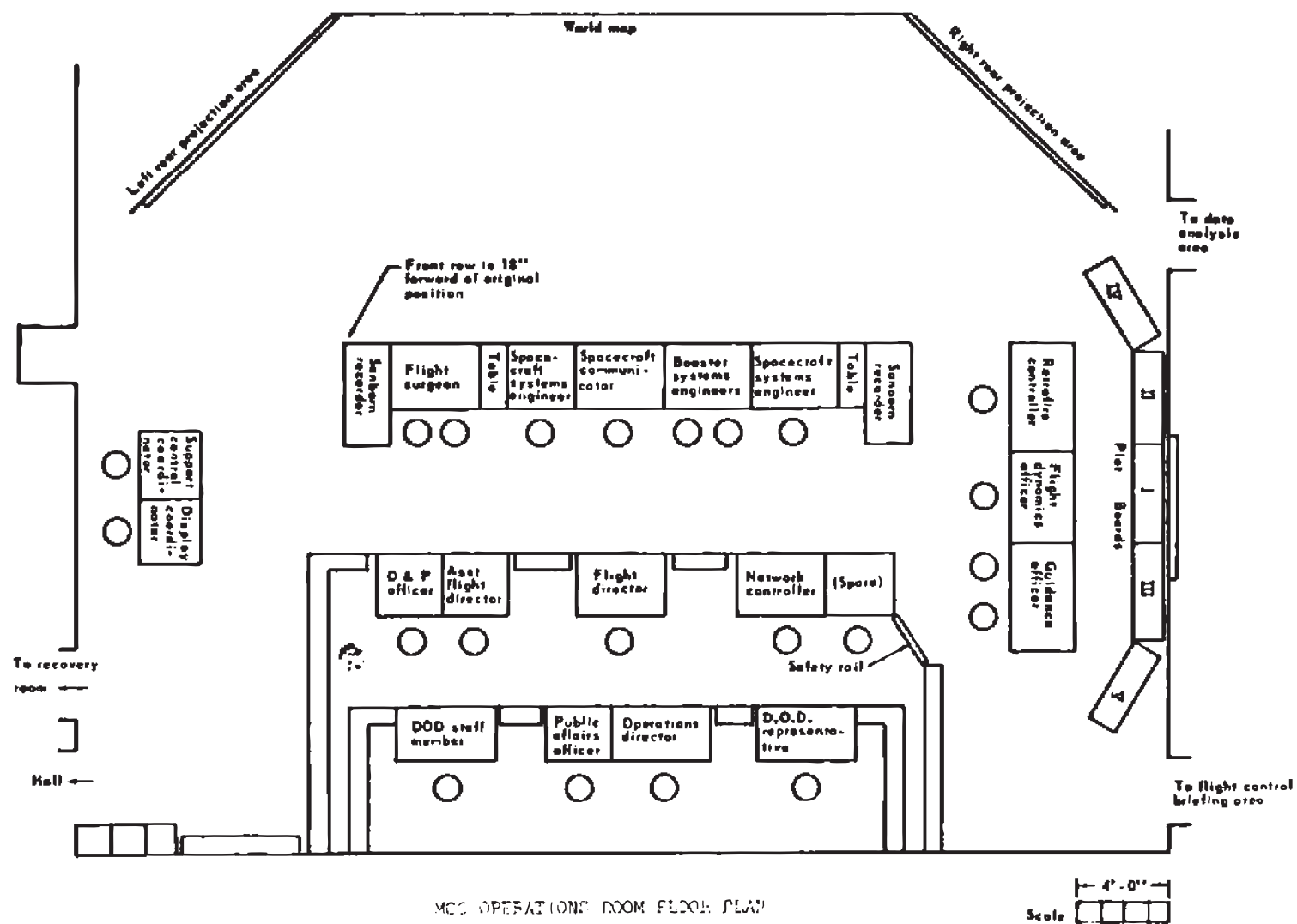


Figure B-2. Layout of the Flight Control Area during the Gemini Program (Provided by Doug Fisher, 2009).



As illustrated in Figures B-1 and B-2, the control room was divided into three sections: the multi-leveled central control room area, the viewing area at the east, and the support area at the west. The front of the control room was dominated by a map of the world, measuring approximately 26' long by 8' high. The map was flanked by trend charts that displayed various functions derived from the telemetry summary messages from the down-range stations (Western Electric no date: 15). The trend charts at the left hand side of the world map displayed eight functions: heart rate; respiration rate; body temperature; manual control fuel remaining; auto pilot control fuel remaining; direct current (DC) volts and DC amperes; electrical power remaining, normal and emergency; and oxygen remaining, normal and emergency. The trend charts to the right of the map also displayed eight functions, including oxygen partial pressure, carbon dioxide partial pressure, coolant quantity remaining, cabin air temperature, cabin pressure, suit inlet air temperature, and suit pressure.

The central control room contained two rows of consoles and a back row of desks, facing the front of the room. The first row contained five consoles and two data recorders (Figure B-1). The second row was comprised of five consoles, including the Flight Director's console in the center, and one data recorder at the right end. The consoles and equipment in the second row were located on an elevated platform. Behind this row, elevated on a second tier level, were three desks manned by controllers having an administrative function (Western Electric no date: 17). The only equipment on each desk was a telephone set. Placed perpendicular to the two rows of consoles, and facing the four plot boards, were the consoles of the Flight Dynamics Officer and the Retrofire Controller. A Data Entry console and teletype printers were located behind the trend charts in the southwest corner of the Support Area. The Raised Viewing Area, separated from the Flight Control Area by a slanted pane glass partition, contained two rows of chairs, plus standing room at the rear.

Compared with the Mercury configuration, the layout of consoles and equipment during the Gemini program, as illustrated in Figure B-2, differed in a few significant ways. At the front of the control room, the trend charts were replaced with rear projection panels; a fifth plot board was added to the right side of the room; and a third console was placed in front of the plot boards to accommodate the Guidance Officer. Two consoles were located along the left side of the room, where originally no consoles were present. Two tables were added to the first row, and another desk was placed along the third row for the Public Affairs Officer. The data recorder originally located at the right end of the second row was removed to accommodate a minor structural modification, i.e., the platform corner was angled, and a safety rail was installed (Figure B-2).

Overall, despite the changes to the consoles and equipment, the basic configuration of the control room was not significantly changed. Examination of photographs from the time of both the Mercury and Gemini programs indicates that the pattern of ceiling lights and HVAC fixtures, as well as floor and wall coverings, stayed the same.